

# United States Patent [19]

## Verkaart

- [54] HEATER FOR PHYSIOLOGICAL FLUIDS  
 [75] Inventor: Wesley H. Verkaart, Dubury, Mass.  
 [73] Assignee: Level 1 Technologies, Inc., Plymouth, Mass.  
 [21] Appl. No.: 866,910  
 [22] Filed: May 27, 1986  
 [51] Int. Cl.<sup>4</sup> ..... A61F 7/12; H05B 1/00  
 [52] U.S. Cl. .... 604/113; 128/399;  
 165/67; 165/156; 422/46  
 [58] Field of Search ..... 604/113, 114, 4, 53,  
 604/80, 82, 259, 322; 128/399-401, DIG. 3;  
 165/154, 156, 67, 68; 285/345, 231; 422/46  
 [56] References Cited

### U.S. PATENT DOCUMENTS

1,873,590	8/1932	James	285/243
2,432,592	12/1947	Stecher et al.	285/231
2,910,981	11/1959	Wilson et al.	604/114
3,064,649	11/1962	Fuson	128/400
3,374,066	2/1968	Farrat	604/113
3,643,733	2/1972	Hall et al.	165/154
3,831,672	8/1974	Battisti	165/156
4,066,119	1/1978	Siedman	165/67

- [11] Patent Number: **4,759,749**  
 [45] Date of Patent: **Jul. 26, 1988**

4,437,513	1/1984	Castiglioni et al.	165/154
4,475,584	10/1984	Martin et al.	165/154
4,559,999	12/1985	Servas et al.	165/156
4,562,890	1/1986	Matoba	165/156
4,623,333	11/1986	Fried	604/113
4,678,460	7/1987	Rosner	604/80

Primary Examiner—C. Fred Rosenbaum  
 Assistant Examiner—Mario Costantino  
 Attorney, Agent, or Firm—Berman, Aisenberg & Platt

### [57] ABSTRACT

A self-contained portable unit for heating physiological fluids is disclosed. A heat exchanger is disposable to ensure sterility, and the heat exchanger is attached to a heating system by inserting it between opposed fluid connection elements. One of the fluid connection elements is movable to permit the heat exchanger to be installed and removed easily by inserting one end of the heat exchanger in one of the fluid connection units and moving the other fluid connection unit into contact with an opposite end of the heat exchanger. The heating fluid is heated by an electric heating element and is circulated by an electric pump.